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UROLOGY

End-Stage Renal Disease (ESRD)

What is renal failure?

Renal failure refers to temporary or permanent damage to the kidneys that results in loss of normal kidney function. There are two different types of **renal** failure - acute and chronic. Acute **renal** failure has an abrupt onset and is potentially reversible. Chronic failure progresses slowly over at least three months and can lead to permanent **renal** failure. The causes, symptoms, treatments, and outcomes of acute and chronic are different.

Conditions that may lead to acute or chronic **renal** failure may include, but are not limited to, the following:

Acute Renal Failure	Chronic Renal Failure
Myocardial infarction - a heart attack may lead to temporary kidney failure.	Diabetic nephropathy - diabetes can cause permanent changes, leading to kidney damage.
Rhabdomyolysis - kidney damage that can occur from muscle breakdown. This condition can occur	Hypertension - chronic high blood pressure (hypertension) can lead to permanent kidney damage.

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from severe dehydration, infection, or other causes.	
Decreased blood flow to the kidneys for a period of time. This may occur from blood loss or shock.	Lupus (SLE) - a chronic inflammatory/autoimmune disease that can injure the skin, joints, kidneys, and nervous system.
An obstruction or blockage along the urinary tract.	A prolonged urinary tract obstruction or blockage.
Hemolytic uremic syndrome - usually caused by an E. coli infection, kidney failure develops as a result of obstruction to the small functional structures and vessels inside the kidney.	Alport syndrome - an inherited disorder that causes deafness, progressive kidney damage, and eye defects.
Ingestion of certain medications that may cause toxicity to the kidneys.	Nephrotic syndrome - a condition that has several different causes. Nephrotic syndrome is characterized by protein in the urine, low protein in the blood, high cholesterol levels, and tissue swelling.
Glomerulonephritis - a type of kidney disease that involves glomeruli. During glomerulonephritis, the glomeruli become inflamed and impair the kidney's ability to filter urine. Glomerulonephritis may lead to chronic renal failure in some individuals.	Polycystic kidney disease - a genetic disorder characterized by the growth of numerous cysts filled with fluid in the kidneys.
Any condition that may impair the flow of oxygen and blood to the kidneys such as cardiac arrest.	Cystinosis - an inherited disorder whereby the kidneys have excessive excretion or certain amino acids. This leads to severe kidney stones.
	Interstitial nephritis or pyelonephritis - an inflammation to the small internal structures in the kidney.

What is end-stage renal disease (ESRD)?

End-stage renal disease is when the kidneys permanently fail to work.

What are the symptoms of renal failure?

The symptoms for acute and chronic **renal** failure may be different. The following are the most common symptoms of acute and chronic **renal** failure. However, each individual may experience symptoms differently. Symptoms may include:

Acute: (Symptoms of acute **renal** failure depend largely on the underlying cause.)

- hemorrhage
- fever
- weakness
- fatigue
- rash
- diarrhea or bloody diarrhea
- poor appetite
- severe vomiting
- abdominal pain
- back pain
- muscle cramps
- **no** urine output or high urine output
- history of recent infection (a risk factor for acute **renal** failure)
- pale skin
- nosebleeds
- history of taking certain medications (a risk factor for acute **renal** failure)
- history of trauma (a risk factor for acute **renal** failure)
- swelling of the tissues
- inflammation of the eye
- detectable abdominal mass
- exposure to heavy metals or toxic solvents (a risk

factor for acute **renal** failure)

Chronic:

- poor appetite
- vomiting
- bone pain
- headache
- insomnia
- itching
- dry skin
- malaise
- fatigue with light activity
- muscle cramps
- high urine output or **no** urine output
- recurrent urinary tract infections
- urinary incontinence
- pale skin
- bad breath
- hearing deficit
- detectable abdominal mass
- tissue swelling
- irritability
- poor muscle tone
- change in mental alertness
- metallic taste in mouth

The symptoms of acute and chronic **renal** failure may resemble other conditions or medical problems. Always consult your physician for a diagnosis.

How is renal failure diagnosed?

In addition to a physical examination and complete medical history, diagnostic procedures for **renal** failure may include the following:

- **blood tests** (to determine blood cell counts, electrolyte levels, and kidney function)
- **urine tests**
- **chest x-ray** - a diagnostic test that uses invisible electromagnetic energy beams to produce images of internal tissues, bones, and organs onto film.
- **bone scan** - a nuclear imaging method to evaluate any degenerative and/or arthritic changes in the joints; to detect bone diseases and tumors; to determine the cause of bone pain or inflammation.
- **renal ultrasound (Also called sonography.)** - a non-invasive test in which a transducer is passed over the kidney producing sound waves which bounce off the kidney, transmitting a picture of the organ on a video screen. The test is used to determine the size and shape of the kidney, and to detect a mass, kidney stone, cyst, or other obstruction or abnormalities.
- **electrocardiogram (ECG or EKG)** - a test that records the electrical activity of the heart, shows abnormal rhythms (arrhythmias or dysrhythmias), and detects heart muscle damage.
- **kidney biopsy** - a procedure in which tissue samples are removed (with a needle or during surgery) from the body for examination under a microscope; to determine if cancer or other abnormal cells are present.

Treatment for acute and chronic renal failure:

Specific treatment for **renal** failure will be determined by your physician based on:

- your age, overall health, and medical history
- extent of the **disease**
- type of **disease** (acute or chronic)
- underlying cause of the **disease**
- your tolerance for specific medications, procedures, or therapies
- expectations for the course of the **disease**
- your opinion or preference

Treatment may include:

- hospitalization
- administration of intravenous (IV) fluids in large volumes (to replace depleted blood volume)
- diuretic therapy or medications (to increase urine output)
- close monitoring of important electrolytes such as potassium, sodium, and calcium
- medications (to control blood pressure)
- specific diet requirements

In some cases, patients may develop severe electrolyte disturbances and toxic levels of certain waste products normally eliminated by the kidneys. Patients may also develop fluid overload. Dialysis may be indicated in these cases.

Treatment of chronic renal failure depends on the degree of kidney function that remains. Treatment may include:

- medications (to help with growth, prevent bone density loss, and/or to treat anemia)
- diuretic therapy or medications (to increase urine output)
- specific diet restrictions
- dialysis
- kidney transplantation

What is dialysis?

Dialysis is a procedure that is performed routinely on persons who suffer from acute or chronic **renal** failure, or who have ESRD. The process involves removing waste substances and fluid from the blood that are normally eliminated by the kidneys. Dialysis may also be used for individuals who have been exposed to or ingested toxic substances to prevent **renal** failure from occurring. There

are two types of dialysis that may be performed, including the following:

- **peritoneal dialysis**

Peritoneal dialysis is performed by surgically placing a special, soft, hollow tube into the lower abdomen near the navel. After the tube is placed, a special solution called dialysate is instilled into the peritoneal cavity. The peritoneal cavity is the space in the abdomen that houses the organs and is lined by two special membrane layers called the peritoneum. The dialysate is left in the abdomen for a designated period of time which will be determined by your physician. The dialysate fluid absorbs the waste products and toxins through the peritoneum. The fluid is then drained from the abdomen, measured, and discarded. There are three different types of peritoneal dialysis: continuous ambulatory peritoneal dialysis (CAPD), continuous cyclic peritoneal dialysis (CCPD), and intermittent peritoneal dialysis (IPD).

CAPD does not require a machine. Exchanges, often referred to as "passes," can be done three to five times a day, during waking hours. CCPD requires the use of a special dialysis machine that can be used in the home. This type of dialysis is done automatically, even while you are asleep. IPD uses the same type of machine as CCPD, but treatments take longer. IPD can be done at home, but usually is done in the hospital.

Possible complications of peritoneal dialysis include an infection of the peritoneum, or peritonitis, where the catheter enters the body. Peritonitis causes fever and stomach pain. Your diet for peritoneal dialysis will be planned with a dietitian, who can help you choose meals according to your physician's orders. Generally:

- You may have different protein, salt, and fluid needs.
- You may have different potassium restrictions.
- You may need to reduce your calorie intake, since the sugar in the dialysate may cause weight gain.

- **hemodialysis**

Hemodialysis is can be performed at home or in a dialysis center or hospital by trained healthcare professionals. A special type of access, called an arteriovenous (AV) fistula, is placed surgically, usually, in your arm. This involves joining an artery and a vein together. An external, central, intravenous (IV) catheter may also be inserted, but

is less common for long-term dialysis. After access has been established, you will be connected to a large hemodialysis machine which drains the blood, bathes it in a special dialysate solution which removes waste substances and fluid, then returns it to your bloodstream.

Hemodialysis is usually performed several times a week and lasts for four to five hours. Because of the length of time hemodialysis takes, it may be helpful to bring reading material, in order to pass the time during this procedure. During treatment you can read, write, sleep, talk, or watch TV.

At home, hemodialysis is done with the help of a partner, often a family member or friend. If you choose to do home hemodialysis, you and your partner will receive special training.

Possible complications of hemodialysis include muscle cramps and hypotension (sudden drop in blood pressure). Hypotension may cause you to feel dizzy or weak, or sick to your stomach. Side effects are avoided by following the proper diet and taking medications, as prescribed by your physician. A dietitian will work with you to plan your meals according to your physician's orders. Generally:

- You may eat foods high in protein such as meat and chicken (animal proteins).
- You may have different potassium restrictions.
- You may need to limit the amount you drink.
- You may need to avoid salt.
- You may need to limit foods containing mineral phosphorus (such as milk, cheese, nuts, dried beans, and soft drinks).

Long-term outlook for ESRD:

People with ESRD are living longer than ever. Dialysis treatments (both hemodialysis and peritoneal dialysis), however, are not cures for ESRD, but will help you feel better and live longer. Over the years, ESRD can cause other problems such as bone **disease**, high blood pressure, nerve damage, and anemia (having too few red blood cells). You should discuss prevention methods and treatment options for these potential problems with your

physician.

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